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R. E. DENTON
GENERAL MANAGER
CALVERT CLIFFS

September 9, 1992

U. S. Nuclear Regulatory Commission
Washington, DC 20555

ATTENTION: Document Control Desk

SUBJECT: Calvert Cliffs Nuclear Power Plant
Unit Nos. 1 & 2; Docket Nos. 50-317 & 50-318
Electrical Distribution System Functional Inspection, Combined Inspection Report Nos. 50-317/92-80 and 50-318/92-80

REFERENCES: (a) Letter from Mr. M. W. Hodges (NRC) to Mr. G. C. Creel (BG&E), dated June 5, 1992, Electrical Distribution System Functional Inspection (EDSFI) of Calvert Cliffs Units 1 and 2, Combined Inspection Report Nos. 50-317/92-80 and 50-318/92-80

(b) Letter from Mr. G. C. Creel (BG&E) to Document Control Desk (NRC), dated July 8, 1992, same subject

Gentlemen:

Reference (a) transmitted the EDSFI Inspection Report and requested a schedule for the resolution of the unresolved items in the report. As discussed in Reference (b), this letter forwards our response to the remainder of the unresolved items.

Should you have any further questions regarding this matter, we will be pleased to discuss them with you.

Very truly yours,

RED/DWM/dwm/bjd

Attachments

IE01 1/1

9209150330 920909
PDR ADOCK 05000317
P PDR

cc: D. A. Brune, Esquire
J. E. Silberg, Esquire
R. A. Capra, NRC
D. G. McDonald, Jr., NRC
T. T. Martin, NRC
P. R. Wilson, NRC
R. I. McLean, DNR
J. H. Walter, PSC

UNRESOLVED ITEM #3 (50-317/50-318 92-80-007)

ADEQUACY OF CABLE AMPACITIES

## NRC CONCERN

BG&E Electrical Installation Specification E406 uses Insulated Power Cable Engineers Association (IPCEA) criteria for sizing power cables. For 20, 25, 50, and 60 horsepower motors installed in cable trays, IPCEA requires that the cables be derated 50% of their in-air rating. National Electrical Code (NEC) practice stipulates that 125% of full motor currents be used to determine the minimum required cable ampacity. However, the inspection team noted that motors of these sizes, the derated cable ampacity was determined using less than 125% of rated full load current.

The maximum cable design temperature for continuous operation is 90C. The inspection team noted that the cable sizing for 50 HP motors could cause this value to be exceeded. In addition, the feeder cable to 4kV busses 11 and 12 was determined to operate at 108% load factor under worst case conditions which would correlate to a cable temperature of 102C, well above the 90C design temperature.

## BG&E RESPONSE

With respect to power cable sizing, IPCEA and NEC criteria are separate standards with different technical bases and thus different allowable values. NEC allowable ampacities for cables differ from IPCEA cable ampacities. This implies that the NEC 125% full current factor has meant to be used with NEC cable ampacities.

The Calvert Cliffs licensing basis, as described in the UFSAR, calls for cable sizing based upon IPCEA criteria. Although E406 lists 125% full current values, they are not used in the cable sizing process; only the IPCEA criteria are used. Nonetheless, further review has identified that if the 125% NEC full load current allowance is used with NEC cable ampacities, the NEC criteria are met for these motors.

Calvert Cliffs cable sizing was done in accordance with IPCEA criteria as stated in our licensing basis. In addition, for the motor ratings in questions, NEC sizing criteria are met when properly applied. BG&E nonetheless intends to revise E406 to clearly define the derating practices and requirements for 460V motor power cables. This action will be completed by June 30, 1993.

Regarding the second issue on overloading of the feeder cables to the 11 and 12 4kV busses, the respective load flow calculations are thought to overestimate plant loading and the degraded voltages are of short duration only. Additional research will be conducted on this issue. Review of these considerations coupled with the ongoing plant load measurements should show that the loading on these cables is acceptable. This review will be completed by June 30, 1993. Similarly, if this review identifies unacceptable cables, a plan for further action will be established.

## UNRESOLVED ITEM #6 (50-317/50-318 92-80-010)

## OVERPRESSURE PROTECTION FOR EDG FUEL LINE

### NRC CONCERN

The positive displacement fuel oil transfer pump for each EDG has a solenoid-operated discharge valve which opens and shuts on the same signal which starts and stops the transfer pump. Each pump has an internal relief valve that allows high discharge pressure to relieve to the suction side of the pump. However, the suction line from each Fuel Oil Storage Tank (FOST) to the fuel transfer pump contains a check valve to prevent draining of both FOST in the event of a rupture in one.

During the EDSFI, an inspector raised the concern that if the discharge solenoid valve failed shut with the pump operating, overpressure protection would not be provided. Under the postulated scenario, high pressure discharge fluid would be directed back to the suction side of the pump but, because of the check valves, the pressure would not be relieved. The continued cycling of oil from the pump discharge to the pump suction would cause the fluid to heat up and expand. This expansion could cause additional pressure increase beyond system design pressure.

### BG&E RESPONSE

BG&E has reviewed the scenario postulated during the inspection. In the event the solenoid valve fails to start with the transfer pump, we expect there to be sufficient time to allow for operator action and correction before significant consequences could result. Analysis to confirm this will be completed by April 29, 1993.

UNRESOLVED ITEM #8 (50-317/50-318 92-80-012)

MAINTENANCE PROGRAM FOR AIR START CHECK VALVES

NRC CONCERN

Each EDG has two trains of starting air, consisting of a tank and an air-start solenoid valve. Each EDG has an air compressor which is connected, through check valves, to both air start tanks. The compressor discharge lines from each EDG are joined to form one common supply line. Every time a compressor starts the air supply check valves at the tanks being charged start chattering against their seats in response to the pressure transient created as the reciprocating compressor strokes up and down. The team was concerned that this valve chattering could introduce an undetected common mode failure of the air start system for all three EDGs.

Although the team noted that these valves were included in the recently initiated Check Valve Reliability Program (MN-1-108), they were unable to review the test requirements or results which had been generated at the time of the inspection. This item is unresolved pending the establishment of adequate monitoring procedures, successful inspection results confirming functionality of the valves, and an evaluation of the system configuration and subsequent review by the NRC.

BG&E RESPONSE

BG&E has reviewed this issue and concurs that it represents a potential quality concern. The EDG air start check valves are included in the Check Valve Reliability Program (MN-1-108). This program delineates responsibilities and establishes the mechanisms to monitor and evaluate critical check valves. As part of this program it has been determined that further evaluation of these valves is appropriate.

As a first step, BG&E intends to inspect and perform a leakage test of these valves as EDG availability permits, beginning with the Spring 1993 Unit 2 outage. If excessive valve leakage is discovered during initial inspection and testing of the first valves examined, corrective action and/or compensatory measures will be taken to limit the vulnerability of all EDGs to potential check valve leakage.

These results will be evaluated under the Check Valve Reliability Program to determine the nature and periodicity of future monitoring. Inspection and initial testing of these valves should be completed by September 1, 1994. The scope of future monitoring will also be determined at that time based on the results observed.

UNRESOLVED ITEM #10 (50-317/50-318 92-80-014)

BATTERY CHARGER CONTRIBUTION DURING SHORT CIRCUIT

## NRC CONCERN

The calculated short circuit currents from the two battery chargers have been determined to be at the current limit settings of 110% of full load capacity. However, since these chargers use silicon controlled rectifiers (SCRs) for rectification and control, it is possible that the short circuit output current of each charger could be up to ten times its full load rating for a period of 8 milliseconds (1/2 of a 60 Hz cycle). The inspection team was concerned that the DC bus feeder fuses may be required to operate outside their tested rating and that coordination with the battery mid-span fuse may be compromised.

## BG&E RESPONSE

BG&E believes that this observation does not represent a valid concern. The methodology employed by BG&E in its DC short circuit analysis is consistent with the latest industry standard, IEEE 946-1985. The applicable sections of this standard state (emphasis added):

> **7.9 Available short Circuit Current.** For the purpose of determining the maximum short-circuit current available (fc example, *the required interrupting capacity for feeder breakers/fuses*), the total short circuit current is the sum of that delivered by the battery, charger, and motors (as applicable).
>
> **7.9.2 Chargers.** *The maximum current that a charger will deliver into a short circuit is determined by its current-limit circuit.* The current-limit setting is adjustable in most chargers and may vary from manufacturer to manufacturer. The maximum current that a charger will deliver on short circuit will not typically exceed 150% of the charger ampere rating.

BG&E uses the charger current-limit setting to determine the charger short circuit contribution. In addition, BG&E has contacted the industry committee responsible for this standard and verified that this section is not expected to be revised during the next review.

Based on our compliance with this standard, BG&E believes that its short circuit analysis is adequate and that the NRC concern described above is not consistent with accepted engineering methodology.

UNRESOLVED ITEM #11 (50-317/50-318 92-80-015)

BATTERY VOLTAGE DROP CALCULATION

NRC CONCERN

The inspection team reviewed DC voltage profile calculation E89-42 and noted that conductor temperature was assumed to be 25C. The team found this assumption to be non-conservative and unacceptable. A sample of preliminary re-calculations using a more conservative temperature of 75C showed that safety-related loads were still above the lowest acceptable limit. This item is unresolved pending completion of the calculation considering worst case temperature and subsequent review by the NRC.

BG&E RESPONSE

BG&E intends to complete this calculation by March 31, 1993 and will make it available for NRC review.

## UNRESOLVED ITEM #12 (50-317/50-318 92-80-016)

## MISCOORDINATION

### NRC CONCERN

The inspection team reviewed the coordination of protective devices. One aspect of this review was to examine the relationship between circuit breaker long time delay settings at running currents at reduced voltages. The team found that the Control Room HVAC Compressor motor current, at the running voltage of about 85% of nameplate value, was high enough to cause concern that the current is in the circuit breaker trip region. This item is unresolved pending clarification that the Control Room HVAC Compressor motor breaker will not trip prematurely with lowest running voltage.

### BG&E RESPONSE

The Control Room HVAC Compressor motor is a 100 HP motor and has a nameplate full load current of 155 amperes. This current value would correspond to a running current at 85% voltage near the breaker trip setting of 180 amperes. However, the full load current measured during testing of this motor was 95 amperes. At a running voltage of 85% of nominal the motor current would increase to 112 amperes. This correlates to a trip margin of 1.61, which is more than adequate.

The previous Control Room HVAC Compressor motor had a nameplate full load current of 126 amperes which is more typical for a 100 HP motor. This current level would result in an 85% voltage current of 148 amperes, or a trip margin of 1.21 which is also adequate.

The basis for the current motor's nameplate full load current is not known. However, based on measured data for full load current and on nameplate data from the previous motor which is consistent with expected values for 100 HP motors; BG&E has reasonable assurance that the Control Room HVAC Compressor motor breaker will not trip prematurely with lowest (85%) running voltage.